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# STORAGE OF SWEETPOTATOES

THE STORAGE OF SWEETPOTATOES is a sound economic practice which stabilizes the industry and makes the crop available over the greater portion of the year.

Satisfactory storage is dependent upon sweetpotatoes that are free from disease and carefully handled; moreover, they must be cured after being placed in the house and kept at a uniform temperature and humidity while in storage.

A substantial and satisfactory house for the storage of sweetpotatoes can be built at moderate cost. If some existing building is available it is usually possible to alter it so as to make it suitable for this purpose.

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# STORAGE OF SWEETPOTATOES

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## IMPORTANCE OF SWEETPOTATO STORAGE

STORAGE of sweetpotatoes is a practice of great benefit to both the producer and the consumer, since it extends throughout the year the period that the product is available. Before satisfactory storage methods were developed, sweetpotatoes had to be marketed soon after harvest, thus causing market gluts and ruinously low prices. In the more northerly markets, particularly, the product was generally available for only a few months of the year.

It is not possible to indicate accurately the great quantities of this commodity that are held in storage before being marketed. It is known, however, that usually 50 to 55 percent of the total rail shipments of any one crop of sweetpotatoes is moved from November to June, most of which certainly must be stored for some time. The estimated 5 to 6 million bushels of rail shipments between November and June take no account of the enormous volume that is moved by motor truck. It is not unreasonable to believe that movements by motor truck are equivalent to, if not greater than, those by rail; thus probably 10 to 12 million bushels of sweetpotatoes are shipped from storage annually. The actual storage capacity is doubtless much larger than this, since allowance must be made for considerable shrinkage, loss from decay, and for sweetpotatoes stored for seed and other purposes but never marketed.

## VARIETIES FOR STORAGE AND MARKET

Most of the commercial crop of sweetpotatoes is composed of no more than a half dozen varieties. The so-called "dry-flesh" varieties, such as Big-Stem Jersey and Yellow Jersey, are grown mainly in the more northerly regions in which sweetpotatoes are produced commercially and are sold for the most part on the markets of the northern half of the country. Until about 1928 or 1930 these markets showed a very strong preference for the dry-flesh varieties. Since that time, on northern markets there has been a rapid gain in popularity of the moist-flesh sorts, such as Porto Rico, Nancy Hall, and Southern Queen. Large quantities of the moist type are used on southern markets and for home use in the South, but the dry-flesh varieties are grown mainly for shipment to the North. It was formerly recommended that the moist varieties should be grown only for the southern markets, but large quantities are now being sold in the North.

Although all important varieties can be stored successfully under proper conditions, numerous experimental studies and practical observations have shown that some varieties undergo less loss from shrinkage and decay than others. Studies in the Department of Agriculture have shown that Big-Stem Jersey appears to be less susceptible to black rot in storage than are Porto Rico and Nancy Hall. On the other hand, experiments by the Department and also by others have shown by 4-year tests that at the end of storage periods of 3 and 5 months, respectively, a markedly higher percentage of Big-Stem Jersey than of Nancy Hall or Porto Rico was lost by various kinds of decay. Southern Queen, another moist-flesh variety, showed the least loss from rot of any of the more than 30 varieties studied.

Resistance to decay is not the only important characteristic by which to determine the adaptability of a variety to storage. Considerable shrinkage occurs as a result of loss of water and even some shrinkage from loss of solid substances of the sweetpotato. Although the amount of shrinkage is more nearly the same among these important varieties than is the amount of loss from rot, the Big-Stem Jersey rather consistently has shown somewhat greater shrinkage and decay than the others. Toward the end of the storage period, Big-Stem Jersey and Yellow Jersey usually wither at the ends, while Nancy Hall and Southern Queen do not. Consequently, Big-Stem Jersey and Yellow Jersey should be removed and sold before the others if market conditions are favorable.

A variety for storage and market should not be selected solely because of slight superiority in behavior during storage, for these differences among the important sorts are not great. The primary consideration should be the requirements of the markets on which the product is to be sold.

## REQUIREMENTS FOR SUCCESSFUL STORAGE

Seven very important points must be observed if the most satisfactory results are to be obtained in the storing of sweetpotatoes: (1) The storage house must be clean and sanitary; (2) the crop must be harvested before it is injured by low temperature in the fall; (3) particular care must be taken to avoid cutting, bruising, or otherwise injuring the sweetpotatoes during digging, picking up, grading, placing in containers, and moving to the storage house; (4) injured

roots or roots showing evidence of disease must be carefully excluded from storage; (5) the sweetpotatoes must be thoroughly cured immediately after being put into the house; (6) the proper storage temperature must be maintained after curing; and (7) the hazards of spreading disease in the house must be avoided by leaving the sweetpotatoes undisturbed until they are removed from the house and by insuring as far as possible that the house is rat- and mouse-proof.

A clear understanding of certain fundamental facts concerning the behavior of the sweetpotato will show why these seven points are of such importance, and will greatly assist the individual grower and handler of sweetpotatoes in solving his storage problems. If it is understood why a certain recommendation is made, what natural processes must be controlled, and exactly how various practices or conditions affect the behavior of the sweetpotato, the importance of proper management is more likely to be realized, and greater care will be exercised. It is for these reasons that certain facts and storage requirements are discussed here in considerable detail.

### DISINFECTION OF STORAGE HOUSE

Before any sweetpotatoes are placed in the house, it should be cleared of all old or decayed sweetpotatoes or other debris and swept clean. Then it should be disinfected by one of several methods, any one of which will be satisfactory if properly carried out. It is essential that the cleaning and disinfection be done thoroughly if they are to be effective in helping to control storage losses. Among the several methods of disinfection are the following:

Spray the entire interior of the house with a solution of copper sulphate (bluestone), made in the proportions of 2 pounds of copper sulphate to 50 gallons of water. All bins or other containers previously used should be treated also.

Apply, thoroughly, a coat of ordinary whitewash to the entire interior.

The most effective method is to fumigate the house with formaldehyde gas. Formaldehyde is an irritating and poisonous substance, and must not be breathed nor allowed to get into the eyes. It is thus necessary to get out of the house quickly after the gas is released. Where formaldehyde is to be used, the following directions should be noted:

Each 1,000 cubic feet of space to be fumigated requires 3 pints of commercial formalin (a 40-percent solution of formaldehyde in water) and 23 ounces of potassium permanganate. The potassium permanganate should be placed in a deep container such as a 1- or 2-gallon stone jar and the required amount of formalin poured upon it. A sufficiently large container for the formalin should be used, so that the required amount can be poured into the jar without the necessity of measuring successive portions. Speed in handling is essential for safety. If a large house is to be fumigated, several receptacles should be used, distributing them uniformly over the house. If several are used, the required amount of permanganate should be measured into each beforehand and the jars properly distributed over the house. All doors and windows should be tightly closed except one convenient door. The formalin should be first poured into the container farthest from the open door, and the operator should work rapidly toward it, getting out of the house promptly. The house should be kept tightly closed for at least 24 hours.

### AVOIDANCE OF COLD INJURY BEFORE HARVESTING

The sweetpotato is very sensitive to low temperature and is definitely injured at temperatures somewhat above freezing. It will not withstand freezing even for a short time. This harmful effect of chilling has an important bearing upon the proper time for harvesting. It is a common practice to harvest the crop for storage as late as possible and still supposedly avoid injury from cold. Many

growers delay digging until the first light frost occurs, when the leaves of the plants may be damaged or killed in parts of the field. The belief is general that although the leaves may be killed no damage to the roots will result unless the cold is severe enough to kill the stems of the plants also. If the roots are dug promptly after a light frost, that belief may be borne out; yet it is quite possible for damage to be done as a result of the roots lying several days in a cold, wet soil after only the leaves are killed.

As soon as the growth of the sweetpotato vine is stopped in the fall, marked changes begin in the root. One of these is an increase in the water content. Soil temperature may be harmfully low at the same time. The conditions surrounding the sweetpotatoes are just the opposite of those recommended for successful storage. The effects of temperature and moisture upon keeping quality will be discussed in detail later in this bulletin.

Experiments by the Alabama Agricultural Experiment Station illustrate very well what may happen as a result of delayed digging. Triumph sweetpotatoes dug before frost and 5 days after frost showed losses, after 4 to 5 months in the storage house, amounting to 0.4 percent and 75 percent, respectively. The Porto Rico variety handled in the same ways on the same dates showed losses of 0.8 percent and 71 percent, respectively. The losses from delayed harvest are not always so striking, but this work shows what risk may be involved. Even the apparently sound roots from the late-dug lots were found to be of very poor quality after a few months, while those dug before frost were of good eating quality.

### CARE IN DIGGING AND HANDLING

The sweetpotato root is covered by a thin, delicate skin that is very easily broken. Striking the roots with harvesting implements or throwing them from row to row or into containers injures this delicate skin. Cuts and bruises may also be produced if the sweetpotatoes are placed in crates or other containers that have sharp edges or rough places on the interior or if the packages are roughly hauled or handled. Some of these injuries may appear to be insignificant, but the great importance of keeping their occurrence down to the lowest possible minimum can hardly be overemphasized.

It is generally known that any break in the skin in man or animal or in the outermost layers of cells of a plant offers a place for infectious organisms to enter, which may result in serious consequences, in some cases even death. It is also generally understood that a cut or other wound that exposes delicate interior cells or tissues in man or animals may become infected at any time before it has actually healed by the formation of new cells that effectively prevent the entrance of bacteria. A wound is not healed just as soon as blood ceases to flow from it. These relationships in man and animals are not entirely different from those existing in plants. It is commonly observed that if a sweetpotato is cut or bruised during harvest or handling, a heavy, sticky, milky juice exudes from the freshly exposed surfaces of the injured cells. This juice dries down in a few hours and may appear to have closed the wound, but as a matter of fact considerable time is required for the growth of new cells that effectively protect the interior cells from infection by rot organisms. The dried juice on the surface of a wound on a sweetpotato is in itself no appreciable

protection against the entrance of rots, and its presence must not mislead one into believing that such a root is safe from storage disease.

Several years ago the Department of Agriculture made tests for 4 years in storage houses in the South, to determine the effect of careful handling on the amount of decay and shrinkage losses as compared with ordinary handling. In the carefully handled lots the loss from decay varied from 0.4 to 5.6 percent in different tests, whereas the comparable lots handled without special care lost 1.0 to 15.6 percent. On an average, the carefully handled lots lost only one sixth as much from decay as the others. Furthermore, careful handling resulted in slightly less loss from shrinkage, 5.0 to 9.4 percent as compared with 7.4 to 20.4 percent in the ordinary handling. On an average the total shrinkage and decay losses of the carefully handled lots were less than two thirds of the losses that occurred in the material handled with the ordinary lack of care.

### SELECTION OF SOUND, DISEASE-FREE ROOTS

Certain diseases of sweetpotatoes cannot be controlled by storage-house management.[1] These diseases, as well as many that can be controlled by storage-house management, occur first in the field, from which they may be carried to the storage house. Thus, the first step to be taken in successfully storing sweetpotatoes is to control diseases in the field so that they will not be carried into the storage house later. Complete freedom from any trace of disease in the field can hardly be expected, therefore the roots should be noted carefully as they are picked up, and all those that show disease should be kept out of the storage or market containers. This is especially important with reference to sweetpotatoes that are to be stored or held for any appreciable length of time.

Tests have been made to determine just what happens to injured roots in storage. Sweetpotatoes were carefully sorted immediately after harvest and the injured and uninjured ones placed in separate containers. Results were obtained on three varieties for two seasons. After being stored for 5½ months, the uninjured lots on an average had lost 13.8 percent by shrinkage and less than 1 percent from rots, whereas the injured roots had lost 28.1 percent by shrinkage (over twice as much) and 13.8 percent (15 times as much) from decay. During the curing period alone (19 days) the injured sweetpotatoes lost 14.8 percent by shrinkage while the sound lots lost only 7.2 percent. These simple tests show in a concrete way that the most careful handling and the exclusion of unsound material greatly reduce storage losses and are worth the little extra trouble. Only the sound, disease-free sweetpotatoes are fit to be stored.

### CURING

Even though the greatest possible care is used in harvesting and handling, it is known that there are of necessity at least two small wounds on almost every sweetpotato—on the ends, broken in harvesting. Any break in the skin affords a place for disease to get started, and the mere drying of the white juice in a cut or wound does not effectively close that wound against disease.

[1] Detailed information on disease control in the field can be found in U.S. Department of Agriculture Farmers' Bulletin 1059, Sweet-Potato Diseases, which can be obtained from the Superintendent of Documents, Washington, D.C., for 5 cents.

Most sweetpotato-rot organisms rarely infect sweetpotatoes through the sound, unbroken skin. A cut or broken place will actually heal under proper conditions by the formation of new cells that are much like the cells of the skin in their ability to prevent infection. These new cells form a layer just beneath the wound, and because of the corky nature of this layer it is commonly called wound cork. Workers in this Department have proved by severe tests that this wound-cork layer greatly retards infection and to a large degree actually prevents it. The wound-cork layer cannot be seen by the naked eye. It is formed beneath the dried and hardened surface that soon develops over a wound, but it is formed only under certain favorable conditions that will be described later. The mere presence of a dried and hardened surface over a wound is no indication that it has been healed by a layer of wound cork beneath. The dry, hardened surface of a wound may offer slight resistance to infection, but is too little protection to afford safety. How then can it be known that injuries have been healed by wound cork and that the sweetpotatoes are relatively safe from infection? The surest way is to provide for the newly harvested potatoes the most favorable conditions for a rapid formation of wound cork.

Numerous investigations have been made to determine the exact conditions most favorable for this healing process. The most significant fact found in these studies is that wound-cork formation or healing proceeds most rapidly at approximately the temperature that has been recommended for years for properly curing sweetpotatoes. At 89° F. and a relative humidity of 92 percent, wound cork starts to form in 2 days and is well developed in about 5 or 6 days. At lower or higher temperatures or at lower humidity it develops less rapidly. However, at a temperature of 84° to 85° and a relative humidity of about 85 percent, healing is started by the third day and proceeds rapidly. Even though the temperature is high enough, no healing will take place promptly if the air immediately surrounding the sweetpotato is as dry as 66 percent relative humidity.

These few points explain why it is important to have the storage house warmed up to 85° F. at the time the first sweetpotatoes are put into it and also why the roots should be placed in the house promptly after they are dug. It is permissible to leave them exposed to the sun and wind for an hour or so immediately after digging, so that adhering soil will dry out and be more easily removed. It is clear, however, that no actual healing of cuts occurs on surfaces exposed to drying winds. If healing is to be started promptly so as to build up protection against infection as soon as possible, the material must be placed in crates, baskets, or bins in the house at the prescribed temperature within a few hours of digging. In no case should harvested material be allowed to remain outside the storage house overnight.

The reader will note later in this bulletin recommendations for adequate ventilation of the storage house and emphasis of the importance of rapid removal of the moisture evaporated from the curing sweetpotatoes. It may appear at first thought that thorough storage-house ventilation will result in such a low relative humidity of the air surrounding the sweetpotatoes that the healing processes will be retarded and possibly prevented. There is probably nothing to fear in this connection, however. The sweetpotatoes will be packed in crates or baskets and stacked in large piles, or stored in bins, around which

air circulates. Because of the moisture being given off by the roots, the air immediately surrounding them is certain to be moist, particularly within the packages or bins. It is hardly likely that currents of air caused by the ventilating system will be so strong and so dry as to retard healing. The usual difficulty is that of obtaining ventilation enough to prevent condensation of moisture on the sweetpotatoes and on the walls of the house, with the consequent rapid spread of disease.

Many handlers of sweetpotatoes have claimed that a curing temperature of 85° F. is too high, that it causes excessive shrinkage, and that 75° is better. It has been shown that healing is slightly slower at 75° than at 85°. Some recent work in this Department shows that although shrinkage during curing is slightly less at 75° than at 85° the subsequent shrinkage during storage at 55° is greater for the sweetpotatoes cured at 75°. Furthermore, those cured at 75° contained a markedly lower proportion of attractive, high-grade roots than did those cured at 85°. A single-year's tests with several varieties showed no difference in sprout-producing power between lots cured at 75° and at 85°.

The length of time required for proper curing cannot be stated as definitely as can the temperature and humidity requirements. The condition of the crop at harvest, the weather during the curing period, the manner of placing the sweetpotatoes in the storage house (whether in baskets, crates, or bins), and the efficiency of the house and its operation all help to determine how rapidly the curing process will proceed. In practice, the length of the curing period ranges all the way from 10 days to 3 weeks, and sometimes longer, depending largely on the ideas of the individual storage-house manager. Three weeks is generally too long. Numerous observations and the experience of successful persons show that in general the curing temperature should be kept up for 10 to 15 days. If the storage house is properly built and managed, the sweetpotatoes can be successfully stored after a 10- to 15-day curing period.

The healing of wounds is but one of the several important changes that take place in the sweetpotato root during curing. A considerable loss in weight occurs, principally as a result of loss of water by evaporation, but also to a small extent because of loss of solid substance through respiration. The combined weight losses from these two sources is commonly called shrinkage, although the sweetpotatoes that have lost 8 to 10 percent of their original weight during curing do not appear shrunken nor shriveled. Accompanying the loss of weight there is a slight loss in volume, but if the curing has been done properly the roots will be sound and firm.

During curing, the sweetpotato loses water rapidly at first, the rate becoming relatively slow after a couple of weeks. Since most of the loss in weight is due to loss of water, one might suppose that the curing process causes the root to become more or less dried out. Many persons speak of well-cured potatoes as being well dried out. The surprising thing is that although the roots have lost perhaps 8 to 10 percent in weight, there is almost the same proportion of water and dry matter in them as before curing. Thus the flesh of properly cured sweetpotatoes when baked or otherwise cooked is apparently no less moist than that of uncured ones. In fact, after curing, the

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flesh is apparently much more moist and juicy, even when baked, than when similarly prepared before curing. Curing results in a decided improvement in the sweetness and general culinary quality of the sweetpotato on account of the rapid change of much of the starch to dextrin and sugars.

### CARE DURING STORAGE

No matter how well cured and sound sweetpotatoes may be, careless management of the storage house after curing may cause serious losses. The maintenance of a too-high storage temperature will cause excessive further shrinkage, and letting the temperature fall too low may cause far more disastrous results.

Many products can be stored successfully just above freezing temperature, and some can be frozen slightly for a time without injury. The sweetpotato, however, is very sensitive to low temperatures and will not long survive temperatures within many degrees of freezing. It must be kept at 50° to 55° F. if satisfactory results are to be obtained. Temperatures as low as or lower than 40° may at times be avoided only with difficulty in parts of a house that does not heat evenly. The destructive effects of such chilling should be emphasized.

A temperature of 40° F., although more than 10° above the freezing point of the sweetpotato, is definitely harmful in two ways. When sweetpotatoes are chilled, even though not frozen, there is a very marked increase in their susceptibility to infection by certain rots. Careful studies in accurately controlled storage have shown that if the temperature stays as low as 40° for 3 weeks or more, 40 to 90 percent of the sweetpotatoes may rot. Where the temperature of the house is low the humidity is usually high. Even when the humidity was reasonably low (70 to 80 percent), serious rotting occurred as a result of chilling at 40°, and the rotting is worse at a higher humidity. At 40° rotting could not be prevented by lowering the humidity to 62 percent, which is considerably lower than the humidity at which storage houses are usually maintained. Some rotting occurred from chilling at 40° for only 2 weeks, and chilling at 32° was far more injurious than chilling at 40°.

One of the difficulties in connection with this rotting as a result of chilling is that the damage appears not at once but several weeks after the proper storage temperature of 55° F. has been restored.

The second effect of chilling is an internal discoloration and breakdown of the root that may occur even though it is not attacked by rots. This trouble also does not develop for several weeks after chilling unless the sweetpotatoes have been held at a temperature near the freezing point.

A third effect of chilling in one experiment was that some of the roots, after being chilled for 2 to 5 weeks at 40° F. and then stored at 55°, entirely failed to produce sprouts when bedded. There was no evidence beforehand that these roots had been injured. Unfortunately, very little is known about the effect of storage temperature upon the value of sweetpotatoes for bedding purposes, but this one instance shows the great importance of careful temperature control.

### AVOIDANCE OF REHANDLING DURING STORAGE

It was formerly believed that sorting and removing the rotting specimens would prevent the spread of rots, but experience and experimental studies have proved the opposite to be true. Sorting

and handling cause some bruising of the roots and at the same time spread the rot organisms about, so that the newly injured surfaces become infected. Cases are known in which ill-advised persons have repeatedly sorted out rotten roots only to find the rot spreading faster and faster after each sorting, with the result that most of the crop was discarded as rots. The losses in such cases doubtless would have been far less if the first few rotten roots had been left in place and the entire lot of stored material left undisturbed. Actual tests over a period of 4 years have shown that sorted stock decayed more than twice as much as unsorted. In 6 out of 7 tests sorted stock was more rotted than unsorted, the loss in some instances being four times as great.

It has been observed too that sweetpotatoes exposed to the nibbling of rats and mice decay much more than those not so exposed. The rodents not only injure the roots but doubtless cause a further increase in rotting by carrying the rot organisms about over the stored material. It is therefore quite important that storage houses should be carefully constructed so as to make them as nearly rodent-proof as possible. All vents should be screened with ¼-inch-mesh galvanized-wire cloth. Doors or other openings through which rats or mice might enter during ventilating periods should also be screened.

## HARVESTING AND HANDLING

The implement used to dig sweetpotatoes should be one that does not cut or bruise the roots. One of the best types of diggers is a plow with rolling colters on the beam to cut the vines and with rods attached to the moldboard to free the roots from the soil and vines (fig.1). A "middle buster" is also a good implement for digging sweetpotatoes. After the roots are dug they should be scratched out by hand and allowed to remain exposed long enough to dry. They should never be thrown from one row to another, thrown loose into the wagon bed, or put into bags. The digging should be done, if possible, when the weather is bright and the soil dry.

Sweetpotatoes should be graded in the field, in order to reduce the cost of handling to a minimum. A good plan is to go over the rows and pick up the sound, marketable roots in one basket, then gather all the seed stock in another basket or box and put the injured ones in still another. These boxes or baskets should be loaded on a wagon with springs and hauled direct to the storage house. If the roots are to be stored in baskets, boxes, or crates, the different grades should be put by themselves, and when stored in bulk they should be placed in separate bins. If this method is followed it will not be necessary to grade the roots at the storage house when putting them in. This will effect a saving of time, reduce the loss by decay, and save the cost of extra handling. The roots should be emptied into the bins as carefully as possible, to prevent bruising. Sweetpotatoes can be stored in boxes, hampers, baskets, or bins with satisfactory results. The preference of the individual grower will determine the method to be employed.

## FILLING THE STORAGE HOUSE

### CRATE STORAGE

Where crates are used, a slat floor raised 4 inches from the main floor should be provided, in order to allow air circulation under the crates, and they should be stacked in even rows to the height of 8 feet. A satisfactory method is to stack each row of crates on two 2- by 4-inch pieces set on edge, parallel to each other, and about 1 foot apart, thus permitting ventilation under the crates. In this way the pieces act as a substitute for a slat floor. It is important to do this in order to protect the roots in the first row of crates.

FIGURE 1.—A type of digger with rolling colters attached to the beam, often used for digging sweetpotatoes.

### BIN STORAGE

In filling the storage house, the workmen should begin at the back end of the bins and pour a layer of sweetpotatoes about 2 feet deep in all of the bins rather than fill one bin at a time. If the bins are 8 or 10 feet long, it is a good plan to divide them into two parts. By nailing cleats to the middle support of the bins, as shown in figures 5 and 7, the partition can be raised as the bins are filled. The partition boards should have some space between them to allow free circulation of air. A 1-inch block between the boards will be satisfactory to separate them. By dividing the bins in this way, the back of the bin can be filled without climbing over the sweetpotatoes in the front part. When the roots are taken out, those in one section of a bin can be removed without disturbing the remainder. This is very important where they are sold in small quantities.

## STORAGE-HOUSE MANAGEMENT

While the newly dug sweetpotatoes are being brought in, a fire should be kept in the storage house. A temperature of 80°, preferably 85° F., with plenty of ventilation, should be maintained for 10 days or 2 weeks, depending on weather conditions and the variety of sweetpotatoes. Big-Stem Jersey and Yellow Jersey tend to shrink more than other varieties, so the shorter curing period should be adequate for these varieties. Ventilation is absolutely necessary, and even if it is not possible to keep the temperature up to 85° it is necessary to leave the doors, windows, and ventilators open, so as to drive out the moisture-laden air. The doors and windows may be closed at night and should be kept closed on cloudy days. Some of the ventilators in the floor and through the ceiling should be kept open throughout the curing period, even in cloudy or rainy weather. The air inside the house should be kept warmer than the outside air during the curing period. This will prevent moisture from being deposited on the walls. As the air warms, it expands and takes up moisture. When it cools it contracts and gives up its moisture. This makes it important to get the moisture-laden air out of the house by ventilation. When the roots are thoroughly cured, the temperature should be gradually reduced to 55° and kept as near that point as possible during the remainder of the storage period. If the temperature goes below 48° a fire should be made and the temperature raised to 55°. When the temperature goes above 60° the house should be opened in the cool of the day to lower the temperature to 54° or 55° and then closed. In mild weather the ventilators in the roof may be partly open all the time, but they should be closed in cloudy or cold weather.

## MARKETING

One reason why southern farmers have not received better prices for sweetpotatoes is that they have not used proper methods of handling and marketing. In many cases the roots are badly bruised and cut in digging, put in bags or rough barrels without being graded, and rushed to market when there is an oversupply. The secrets of success in getting high prices are to carefully grade, clean, and pack the product and to put it on the market when there is a good demand. The greatest demand for sweetpotatoes occurs, as a rule, from the middle of December to the middle of March.

When the sweetpotatoes are to be marketed they must be carefully graded, no matter how well the grading was done when they were put in the storage house. The market demands a medium-sized uniform type of sweetpotato, free from bruises or decayed spots. In grading, the large, overgrown, crooked, broken, or bruised roots should be kept at home for feeding or for canning. The best sweetpotatoes will bring a higher price when separated from the culls.

After being carefully graded, the sweetpotatoes should be put into clean, neat, attractive packages. Bags should never be used, as the roots in them become badly bruised when handled. Barrels formerly were used extensively, but the smaller type of package, such as the bushel hamper, bushel box, or basket, is becoming more popular each year. A neat and attractive package of well-graded sweetpotatoes will bring a better price than ungraded ones at almost any time, even when the market is overstocked with inferior goods.

Sweetpotatoes when shipped during the winter must be protected from the cold. When a sweetpotato becomes chilled its quality is impaired, and decay soon follows. In cold weather the package should be covered with paper and the cars heated, in order to keep the roots from being chilled. Some shippers find it an advantage to line their baskets and barrels with paper. For more complete information on packing, shipping, and marketing sweetpotatoes, see United States Department of Agriculture Bulletin 1206, Marketing Southern-Grown Sweet Potatoes.

## CONSTRUCTION OF STORAGE HOUSES

It is good economy to build a substantial sweetpotato storage house, because it will last longer and require less attention than a cheap, poorly constructed one. It would be possible to keep the roots in a cheaper and less carefully constructed house, but the attention required and the additional fuel used would soon exceed the cost of the extra labor and material necessary for building the better one. The chances of loss in a poorly built house are much greater than in one that is well built.

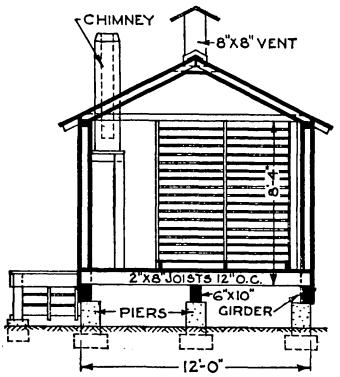


FIGURE 2.—Section through a sweetpotato storage house, size 12 by 16 feet, having a capacity of 400 to 500 bushels in crates or 450 to 500 bushels in bulk, showing arrangement of bins. If crates are to be stored, the height should be 11 feet 6 inches for the same capacity. If stored in bulk in bins, the sweetpotatoes should be loaded not over 6 feet high.

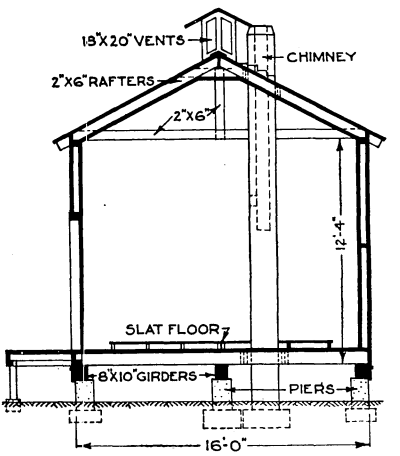


FIGURE 3.—Section through a sweetpotato storage house, size 16 by 29½ feet, having a capacity of about 1,000 bushels in crates, showing various structural details. If the house is used for bin storage, the sweetpotatoes should be loaded not over 6 feet high.

Sweetpotato storage houses may be built of wood, brick, hollow tile, cement, or stone. Wooden houses are preferable, because they are usually cheaper and are easier to keep dry than the other types. It is difficult to keep moisture from collecting on the walls of a cement, stone, or brick house. Where such houses are built they should be lined with lumber, so as to keep the air in the house from coming in contact with the masonry walls. It is best to build sweetpotato storage houses on foundations that allow a circulation of air under them. The "dugout" or house built partly underground, is not satisfactory for storing sweetpotatoes in the South, because it is practically impossible to keep this type of house dry, and moisture in the storage house will cause the crop to rot.

The foundation of the storage house may be in the form of piers or solid walls and should be of such a height that the floor is about on a level with the bottom of the wagon bed, while the footings should be carried below the frost line or to solid ground. Girders 6 by 10 to 10 by 12 inches in size are usually placed on the piers.

Where cement, brick, or stone foundation walls are built, they should extend 18 to 20 inches above the ground level, and plates 2 inches thick and 8 inches wide should be placed on the wall. In using walls for the foundation it is necessary to provide means for ventilation under the house. This can be done by placing small windows in the foundation every 10 to 12 feet. Even where solid outside foundation walls are used it is generally necessary to use piers for the center supports, as shown in figures 2, 3, 4, 5, and 6.

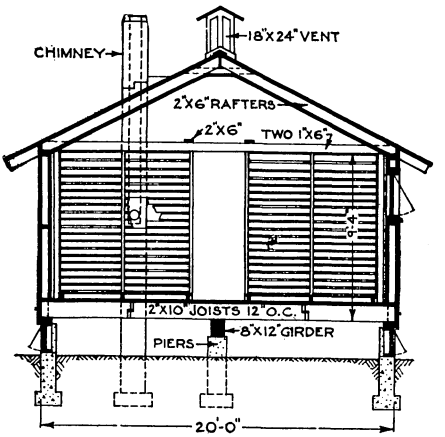


FIGURE 4.—Section through a sweetpotato storage house, size 20 by 40 feet, having a capacity of 2,000 bushels in crates or 2,500 bushels in bulk, showing structural details. If the sweetpotatoes are to be stored in crates, the height should be changed to 12 feet 4 inches for the same capacity. If the house is used for bin storage, the sweetpotatoes should be loaded not over 6 feet high.

The principles of constructing storage houses of various sizes are very much the same; therefore, only one, the 12- by 16-foot house, will be described.

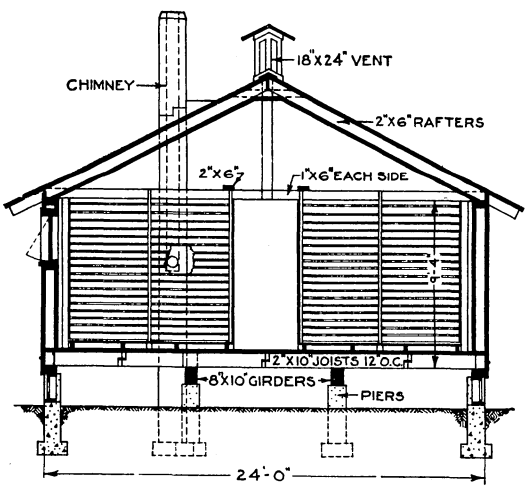


FIGURE 5.—Cross section of a sweetpotato storage house, size 24 by 59½ feet, having a capacity of 4,000 bushels in crates or 5,200 bushels in bulk, showing the arrangement of bins and other structural details. If the sweetpotatoes are to be stored in crates, the height should be changed to 12 feet 4 inches for the same capacity. If the house is used for bin storage, the sweetpotatoes should be loaded not over 6 feet high.

For this small storage house, having a capacity of 400 to 500 bushels, build 3 rows of piers, 1 row under each side and 1 under the center of the house (fig. 2). Girders 6 by 10 inches in size are placed on the piers and on these 2- by 8-inch joists, spaced 12 inches apart from center to center. The walls of the storage house are made by setting 2- by 4-inch studs on the girders every 2 feet and nailing them to the floor joists. On the outside of the studs 1- by 6-inch boards are nailed diagonally to brace the wall; over these a layer of heavy building paper is tacked, and matched siding is then put on. A layer of 1- by 6-inch boards is nailed on the inside of the studding, then a layer of building paper, and over this matched boards. In the

lower south the first layer of boards on the inside of the studding may be omitted so far as the control of temperature is concerned, but in regions of high humidity (near the seacoast) it is deemed advisable to use 4 layers of boards, 2 on the inside and 2 on the outside of the frame, as suggested above. The tighter the walls, the less difficulty will be encountered in controlling both temperature and moisture. Two 2- by 4-inch pieces should be placed on top of the studding for eave plates, to which the rafters are nailed, as shown in figure 2. The floor is made by laying 1- by 6-inch sheathing over the joists, then a layer of heavy building paper, and over this 1- by 4-inch tongue-and-groove flooring. The roof sheathing may be covered with shingles, roofing paper, galvanized iron, or any other kind of roofing material; but galvanized iron is to be preferred, because it is durable and lessens

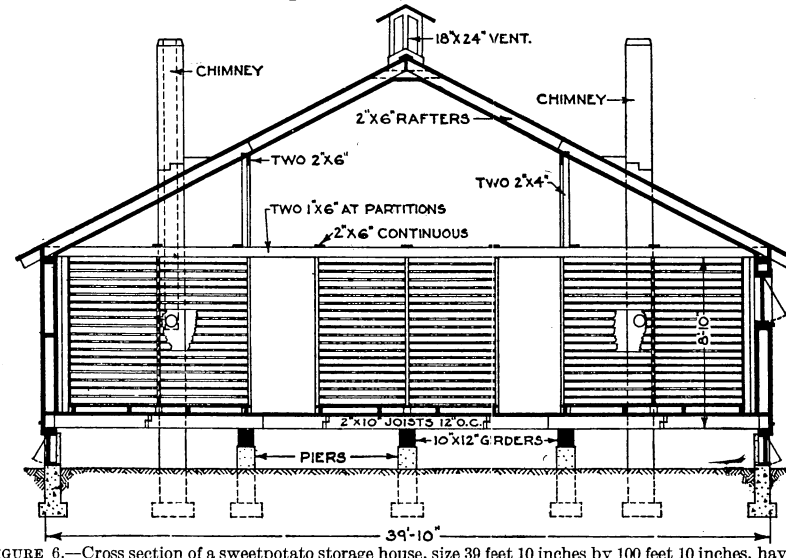


FIGURE 6.—Cross section of a sweetpotato storage house, size 39 feet 10 inches by 100 feet 10 inches, having a capacity of 12,000 bushels in crates or 15,000 bushels in bulk, showing the arrangement of bins and other structural details. If the sweetpotatoes are to be stored in crates, the height should be changed to 11 feet 4 inches for the same capacity. If the house is used for bin storage, the sweetpotatoes should be loaded not over 6 feet high.

danger from fire. Use 2- by 4-inch scantling for rafters, and make the roof tight to keep out the cold. The rafters should be cut to fit over the plate at the lower end and to fit snugly against the ridgepole at the upper end. Outside the rafters put a layer of 1- by 6-inch sheathing, then a layer of building paper, then another layer of 1- by 6-inch sheathing, and over this the roofing material. Inside the rafters nail a layer of 1- by 6-inch sheathing, then a layer of heavy building paper, and over this a layer of matched boards.

The sides of the building should be tied together to prevent spreading. This can be done by nailing 2- by 4-inch pieces to the plates or to the lower ends of the rafters. It would be an advantage to have these pieces over the bin support.

The space between the walls should be left open, because any material used to keep out the cold will absorb moisture. Many storage houses have been built with sawdust, shavings, or similar material between the walls, but this practice should never be followed. Sawdust will take up moisture and when once wet will never dry out. This moisture will keep the house damp and cause the walls to rot.

The air space is a good insulator if the walls are made tight, and they will be tight if the plans illustrated in this bulletin are followed.

Thorough ventilation is necessary in a storage house. This is provided by means of windows, doors, and ventilators in the floor and through the roof, as shown in the various illustrations in this bulletin. The openings in the floor around the stove prevent overheating the sweetpotatoes near the stove. The windows and doors must be made so as to close tightly to keep out the cold. All windows should be made to open from the outside or be fitted with devices for opening them from the inside. Where windows filled with glass are used, outside shutters are put on, as shown in figure 7, and these should be well padded. Some of the windows should be made of glass, so as to admit light without letting in cold air, as it is necessary to have light when working in the house, and in cold weather the house should not be kept open. All of the openings must be made so they can be closed quickly and tightly whenever necessary. The ventilators in the roof should extend through the ceiling, so as to carry out the warm air as it rises. The location and size of the floor and ceiling ventilators are determined by the size of the house, its height, and the interior arrangement. The 12- by 16-foot 400- to 500-bushel house can be suitably ventilated by the use of two 10- by 12-inch floor ventilators near the stove, one 12- by 18-inch floor ventilator in each corner, and three 12- by 12-inch ceiling ventilators. The 16- by 29½- foot 1,000-bushel house is equipped with three 10- by 12-inch floor

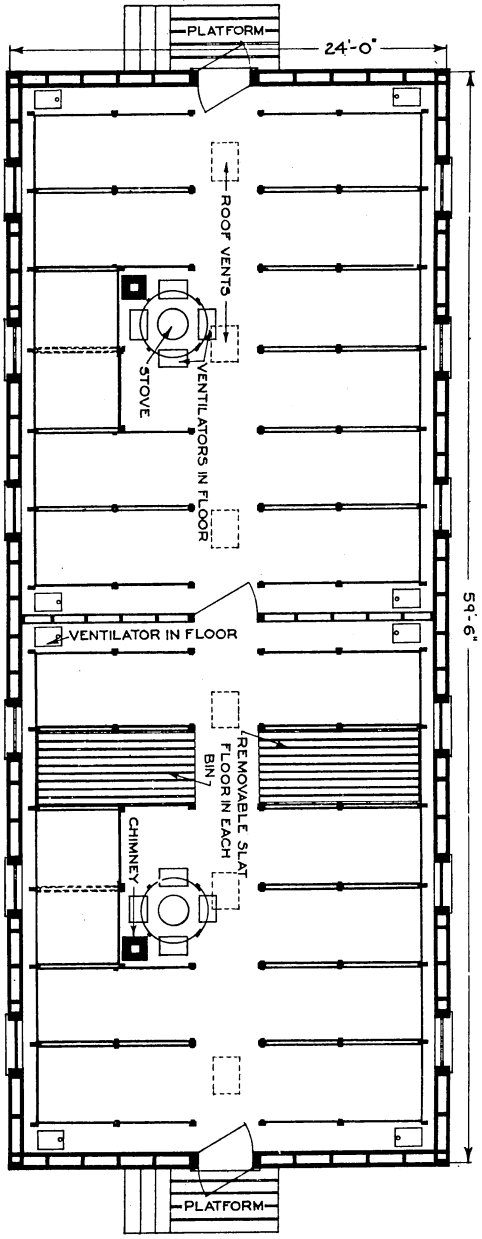


FIGURE 7.—Floor plan of a sweetpotato storage house, size 24 by 59½ feet, having a capacity of 4,000 bushels in crates or 5,200 bushels in bulk.

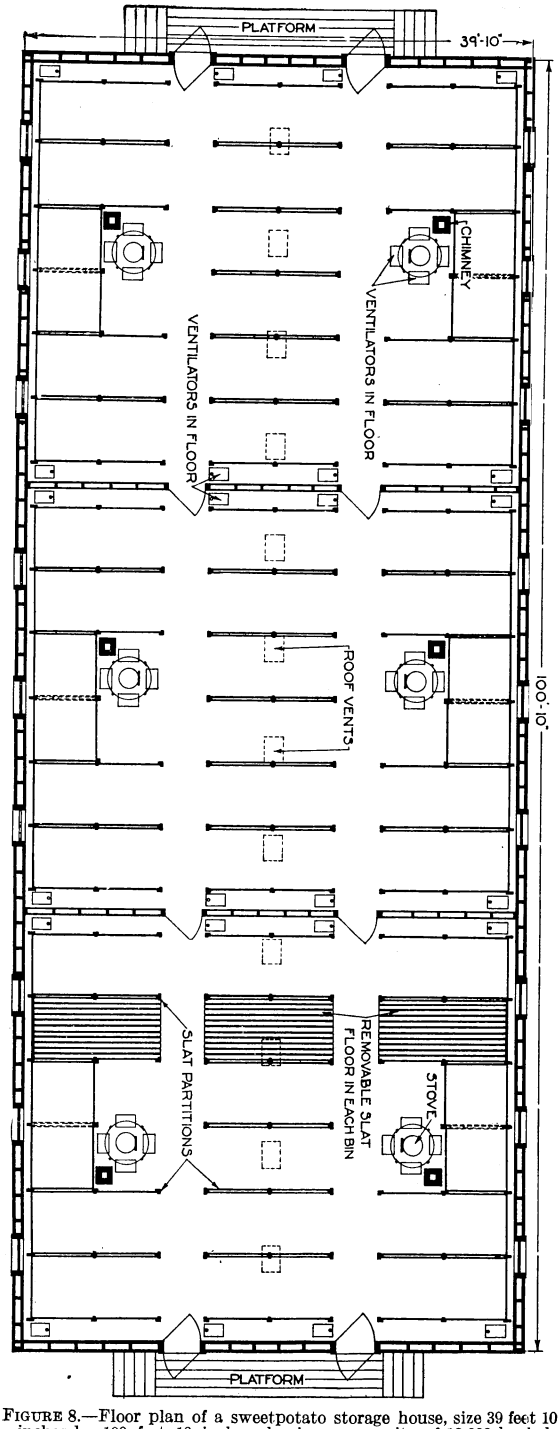


FIGURE 8.—Floor plan of a sweetpotato storage house, size 39 feet 10 inches by 100 feet 10 inches, having a capacity of 12,000 bushels in crates or 15,000 bushels in bulk.

ventilators around the stove and six 12- by 18-inch floor ventilators, one in each corner and one along each side wall near the middle of the building. Two 18- by 20-inch roof ventilators are used in a house of this size. The size and location of the floor ventilators in the larger houses are shown in figures 7 and 8. Complete details covering these plans and specifications may be had upon application to the Bureau of Agricultural Engineering, United States Department of Agriculture.

The arrangement of the interior of the house depends upon the methods of storage used. Some growers store the roots in boxes, crates, baskets, or hampers, while others store them in bins. The smaller containers are to be preferred to bins where it is practicable to use them because they eliminate considerable handling and thus reduce the amount of decay. Many growers store the sweetpotatoes in the hampers that are to be used for marketing them. This is a satisfactory plan, as it requires no outlay of money for storage receptacles, and the packages for shipping must be provided in any event if the crop is to be marketed. Some growers have

bushel boxes made for the special purpose of storing sweetpotatoes, while others employ various types of used crates. With any type of package it is necessary to provide means for ventilation. A false slatted floor is often made by nailing 1- by 4- or 1- by 6-inch boards to 2- by 4-inch scantling. An inch space should be left between the boards to allow the air to circulate. A little space should be left between the stacks of boxes, baskets, crates, or hampers. Where these smaller containers are used, especially when the same package is employed for shipping the crop, it is much easier to disinfect the storage house by spraying than when bins are used. Another advantage in using them is that when decay sets in it usually spreads only to the roots in the single package, whereas in a bin it might spread throughout the entire pile.

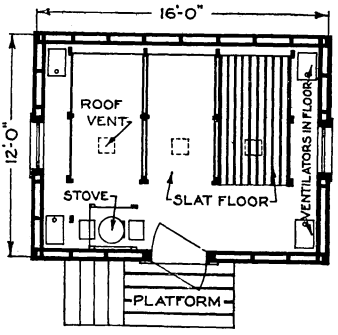


FIGURE 9.—Floor plan of a sweetpotato storage house, size 12 by 16 feet, having a capacity of 400 to 500 bushels in crates or 450 to 500 bushels in bulk.

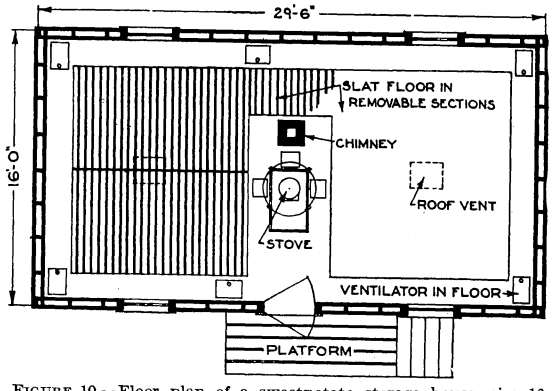


FIGURE 10.—Floor plan of a sweetpotato storage house, size 16 by 29½ feet, having a capacity of about 1,000 bushels in crates, or about 1,000 to 1,200 bushels in bulk, showing arrangement of floor ventilators, roof vents, chimney, and other structural details.

If bins are to be used, the interior of the storage house should be arranged for convenience in handling the sweetpotatoes. A passageway about 3½ to 4 feet in width is usually left between the rows of bins or between the wall and the bins in a house with only one row of bins. Sufficient open space must be left to allow access to the ventilators in the

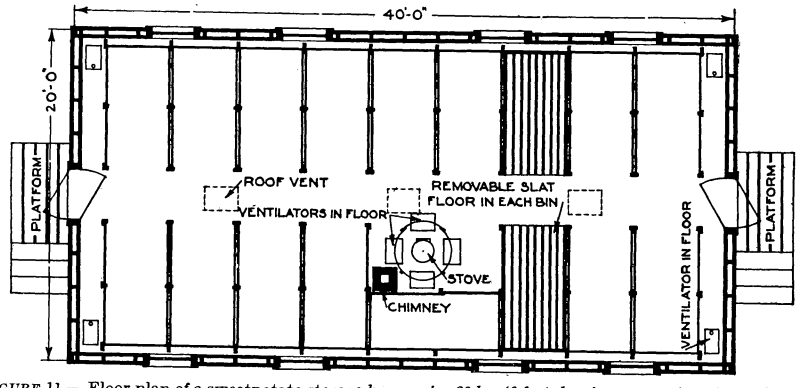


FIGURE 11.—Floor plan of a sweetpotato storage house, size 20 by 40 feet, having a capacity of 2,000 bushels in crates or 2,500 bushels in bulk, showing location of ventilators, stove, arrangement of bins, and other details.

corners of the storage rooms. Satisfactory arrangements of passage-

ways and bins for various-sized houses are shown in the floor plans given in figures 7 to 11.

The bins are made as follows:

For the corner and middle supports, 2- by 4-inch scantlings are set up, the lower ends nailed to the floor and the upper ends to the crosspieces used for tying the sides together. Over the supports 1- by 4-inch boards are nailed, a 1-inch space being left between them. The ends of the bins parallel with the outside wall of the house must be built first, because there is not room enough to work between the bin and the outside wall. In making the slat floors, 2- by 4-inch scantlings are cut to go across the bin and placed on edge, one near each end and one or two equally spaced between. To these 1- by 4- or 1- by 6-inch boards are tacked, a 1-inch space being left between them. If left loose the slat floor racks can be taken out when the house is cleaned and disinfected during the summer. The size of the bins will depend somewhat on the arrangement and size of the house, but it is not advisable to make them more than 5 feet wide, 6 to 8 feet deep, and 10 to 12 feet long. There should be a 6- to 12-inch space between the walls and the bins to permit air to circulate. It is necessary to slat up both sides of the scantlings between the bins, in order to leave an air space between the roots in the different bins. The construction here described allows a 4-inch space between the bins, a 4-inch space under the bins, and over 6 inches between the bins and outside walls.

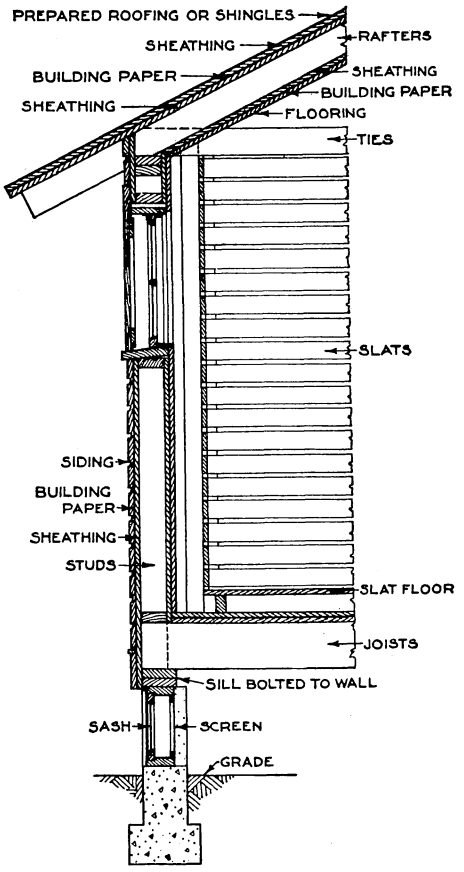


FIGURE 12.—Details of the foundation, floor, wall, and roof construction of a sweetpotato storage house.

## MATERIALS REQUIRED FOR HOUSES OF DIFFERENT SIZES

It is not practicable to give the cost of a sweetpotato storage house, because of the differences in the price of materials and labor in the various sections of the country. However, given the quantities of materials required, it will be easy for one to obtain estimates on the cost of building a storage house. Quantities are given for the houses illustrated in the various figures.

Anyone who contemplates building a sweetpotato storage house after the plans shown in this bulletin can obtain working drawings by writing to the Bureau of Agricultural Engineering, United States Department of Agriculture, Washington, D.C., for any of the plans for the five houses illustrated in figures 2 to 12. In requesting plans, state which one of the five is desired.

### STORAGE HOUSE 12 BY 16 FEET, CAPACITY 400 TO 500 BUSHELS IN CRATES OR 450 TO 500 BUSHELS IN BULK

Quantities are for dimensions shown on the drawing (8-foot studs) and must be altered if dimensions are changed. Footings should be carried below frost line or to solid ground.

If the sweetpotatoes are to be stored in bulk, the items marked with an asterisk (*) are to be omitted. If storage is to be in crates, the stud walls should be 11 feet 6 inches high (instead of 7 feet 8 inches, as shown in the drawings), the items marked with a dagger (†) are to be omitted, and those marked with an asterisk (*) are to be included.

**Concrete:**
*Mixture:*
1 part portland cement, 3 parts sand, and 5 parts gravel or broken stone; or, 1 part portland cement and 6 parts bank-run gravel.
*Quantities:*
Cement, 6 sacks; sand, 20 cubic feet; gravel, 31 cubic feet; or, cement, 6 sacks; bank-run gravel 1½ cubic yards.

**Chimney:**
*Mixture for mortar:*
1 part portland cement, 3 parts sand.
*Quantities:*
Cement, 1 sack; sand, 4 cubic feet; bricks, 190; 1 terra cotta thimble, 6-inch; 6 linear feet 8- by 8-inch terra cotta flue lining.

**Lumber:**
*Girders:*
Two 6 by 10 inches by 12 feet.
Three 6 by 10 inches by 16 feet.
*Joists:*
Seventeen 2 by 8 inches by 12 feet.
*Studs:*
†Nineteen 2 by 4 inches by 16 feet.
*Thirty-eight 2 by 4 inches by 12 feet.
*Plates:*
Six 2 by 4 inches by 16 feet.
Six 2 by 4 inches by 12 feet.
*Ties:*
Four 2 by 4 inches by 12 feet.
*Rafters:*
Eleven 2 by 4 inches by 16 feet.
One 1 by 6 inches by 18 feet (ridge).
*Sheathing* (includes 20 percent waste):
2,084 feet board measure 1 by 6 inches.
*530 feet board measure 1 by 6 inches.
*Drop siding* (includes 20 percent waste):
615 feet board measure 1 by 6 inches.
*265 feet board measure 1 by 6 inches.
*Flooring* (tongue-and-groove, includes 25 percent waste):
1,000 feet board measure 1 by 4 inches.
*280 feet board measure 1 by 4 inches.
**Slat floor:*
Four 2 by 4 inches by 16 feet.
Thirty-five 1 by 4 inches by 14 feet.
*Platform:*
Three 2 by 4 inches by 12 feet.
One 2 by 8 inches by 14 feet.
Three 2 by 8 inches by 12 feet.
One 4 by 4 inches by 6 feet.
One 2 by 12 inches by 12 feet.
Two 1 by 10 inches by 14 feet.
*Trim* (surfaced four sides):
†Five 1⅛ by 4½ inches by 18 feet.
One 1⅛ by 4½ inches by 14 feet.
*Ten 1⅛ by 4½ inches by 12 feet.
Two 1 by 6 inches by 16 feet.
Two 1 by 8 inches by 16 feet.
Two 1 by 8 inches by 12 feet.

**Lumber**—Continued.
*Trim*—Continued.
Two 1 by 6 inches by 18 feet.
70 linear feet 1⅛ by 2½ inches (drip molding).
*Ventilators in roof* (surfaced four sides):
Three 1 by 12 inches by 14 feet.
†*Bins:*
Six 2 by 4 inches by 16 feet.
Three 2 by 4 inches by 12 feet.
Two 2 by 2 inches by 16 feet.
Six 1 by 2 inches by 16 feet.
Thirty-four 1 by 4 inches by 12 feet.
Sixty-five 1 by 4 inches by 14 feet.
*Chimney platform:*
†One 2 by 6 inches by 12 feet.
*Two 2 by 6 inches by 10 feet.

**Roof covering:**
As desired, for 290 square feet.

**Building paper:**
20 squares; *2 squares.

**Miscellaneous:**
2 single sash and frames for 6 lights, 9- by 12-inch glass, 4-inch studs.
1 no. 2 glazed door, 3 by 7 feet; 6 lights, 8- by 10-inch glass.
1 frame for glazed door, 3 by 7 feet, 4-inch studs.
3 pairs 2- by 2-inch galvanized hinges.
2 pairs 2½- by 2½-inch galvanized hinges (windows).
1 pair 3½- by 3½-inch loose-pin butts (glazed doors).
1 pair 6-inch galvanized T hinges (battened doors).
4 pairs 4-inch galvanized T hinges (shutters).
2 pairs chain bolts, chains, and keepers (windows).
3 pairs ⅞- by 2¼-inch sash centers (ventilators).
4 pairs ⅜- by 3-inch bolts, with 4-inch ring (floor ventilators).
9 pairs ⅝- by 18-inch bolts, nuts, and washers (foundation).
2 wrought-steel straps ¼ by 2½ by 18 inches (platform posts).
4 lag screws ¼ by 3 inches (platform posts).
36 linear feet ¼-inch rope.
4 linear feet galvanized flashing 12 inches wide (around chimney).
12 linear feet galvanized flashing 8 inches wide (roof ventilators).
14 square feet ¼-inch mesh wire cloth (vents).
4 window spring bolts.
2 chains 8 inches long, with screw eyes and hooks (windows).
1 sheet-iron pad and heat screen, as detailed.
Latches for doors and shutters, as desired.

**Nails:**
4 pounds twentypenny, 17 pounds tenpenny, 85 pounds eightpenny, 10 pounds sixpenny, 3 pounds eightpenny finishing.

**Paint:**
3 outside coats, 4 gallons.

## STORAGE HOUSE 16 BY 29½ FEET, CAPACITY ABOUT 1,000 BUSHELS IN CRATES

Quantities are for dimensions shown on the drawings. Footings should bear on solid ground. If piers are built to a greater height, they should be increased in cross-sectional area.

**Concrete:**
*Mixture:*
1 part portland cement, 3 parts sand, and 5 parts gravel or broken stone.
*Quantities:*
Cement, 12 sacks; sand, 1¼ cubic yards; gravel, 1½ cubic yards.

**Chimney:**
*Quantities:*
Cement, 3 sacks; sand, ½ cubic yard; bricks, 730; 1 terra cotta thimble, 5-inch; 12 linear feet 8- by 8-inch terra cotta flue lining; 4 linear feet galvanized flashing 18 inches wide.

**Lumber:**
*Girders:*
Six 8 by 10 inches by 16 feet.
Two 4 by 10 inches by 16 feet.
*Joists:*
Twenty-six 2 by 8 inches by 16 feet.
150 linear feet 1 by 3 inches (bridging).
*Studs:*
Sixty-four 2 by 4 inches by 12 feet.
*Horizontals:*
Eleven 2 by 4 inches by 10 feet.
*Braces:*
Eight 2 by 4 inches by 12 feet.
*Plates:*
Twelve 2 by 4 inches by 16 feet.
*Ties:*
Two 2 by 6 inches by 16 feet.
*Rafters:*
Thirty-two 2 by 6 inches by 10 feet.
Two 1 by 8 inches by 16 feet (ridge).
*Collar beams:*
Nine 2 by 6 inches by 8 feet.
*Platform:*
One 2 by 4 inches by 10 feet (posts).
Twelve 2 by 4 inches by 10 feet.
One 2 by 8 inches by 14 feet.
Five 2 by 8 inches by 10 feet.
One 2 by 10 inches by 10 feet (steps).
One 2 by 10 inches by 16 feet (steps).
*Trim* (surfaced 4 sides):
Four 2 by 6 inches by 10 feet (rafters).
Six 1 by 8 inches by 16 feet (base).
Eight 1 by 4½ inches by 12 feet (corner boards).
Four 1 by 6 inches by 16 feet (saddle boards).
Eight 1 by 4½ inches by 8 feet (windows and doors).

**Lumber**—Continued.
111 linear feet 1⅛ by 2½ inches (drip molding).
*Ventilators:*
Four 1 by 10 inches by 12 feet.
Two 1 by 6 inches by 10 feet (roofing boards).
Four 1 by 3 inches by 16 feet.
4 pieces wire cloth ¼-inch mesh, 20 by 15 inches.
12 linear feet galvanized flashing 18 inches wide.
2 pairs 2¼ by ⅞ inch sash centers.
2 screw eyes.
*Sheathing* (includes 20 percent waste):
5,500 feet board measure 1 by 6 inches.
*Flooring* (tongue and groove, includes 25 percent waste):
2,500 feet board measure 1 by 4 inches.
*Drop siding* (includes 20 percent waste):
1,500 feet board measure 1 by 6 inches.
*Slat floor:*
If slats over whole floor are desired, use these items: Seventeen 2 by 4 inches by 12 feet; sixty 1 by 4 inches by 12 feet.
If slats under edges of boxes are desired, use these items: 120 linear feet 2 by 4 inches; 18 pieces 1 by 4 inches by 12 feet.

**Roof covering:**
As desired, for 682 square feet.

**Building paper:**
4,600 square feet.

**Miscellaneous:**
16 pairs 2-inch galvanized butts.
1 pair butts (door).
1 pair 6-inch galvanized **T** hinges.
1 lock and latch (door).
Fasteners for shutters and windows.
Galvanized iron (floor under stove).
15 anchor bolts ⅝ by 18 inches.
3 straps ¼ by ¼ by 12 inches.
6 lag screws ¼ by 3 inches.
Four 6-light sash, 9- by 12-inch glass, with frames and sills.
1 glazed door 3 by 7 feet, 6 lights 8- by 12-inch glass, with frame and sills.
12 linear feet galvanized wire cloth, ½-inch mesh, 18 inches wide.

**Nails:**
35 pounds sixpenny, 6 pounds sixpenny finishing, 200 pounds eightpenny, 40 pounds tenpenny, 5 pounds twentypenny.

**Paint:**
6 gallons.

## STORAGE HOUSE 20 BY 40 FEET, CAPACITY 2,000 BUSHELS IN CRATES OR 2,500 BUSHELS IN BULK

This building is designed for the storage of sweetpotatoes in crates or in one tier of bins in which the roots may be loaded 6 feet high.

Quantities are for dimensions shown on the drawings (9-foot 4-inch studs) and should be altered if dimensions are changed. Footings should be carried below frost line or to solid ground.

If the sweetpotatoes are to be stored in bulk, the items marked with an asterisk (*) are to be omitted. If storage is to be in crates, the stud walls should be 12 feet 4 inches high (instead of 9 feet 4 inches, as shown in the drawings), the items marked with a dagger (†) are to be omitted, and those marked with an asterisk (*) are to be included.

**Concrete:**
*Mixture:*
1 part portland cement, 3 parts sand, and 5 parts gravel or broken stone; or, 1 part portland cement and 6 parts bank-run gravel.
*Quantities:*

| Constituents | Walls | Piers |
|---|---|---|
| Cement | 79 sacks | 7 sacks. |
| Sand | 8.7 cu. yds | 21 cu. ft. |
| Gravel | 14.5 cu. yds | 34 cu. ft. |
| Or— | | |
| Cement | 79 sacks | 7 sacks. |
| Bank-run gravel | 19 cu. yds | 1.8 cu. yds. |

**Chimney:**
*Mixture for mortar:*
1 part portland cement, 3 parts sand.
*Quantities:*
Cement, 3 sacks, *1 sack; sand, 10 cubic feet, *1½ cubic feet; bricks 700, *bricks 90; 1 terra cotta thimble, 6-inch; 12 linear feet 8 by 8 inch terra cotta flue lining, *4 linear feet.

**Lumber:**
*Girders:*
Two 8 by 12 inches by 16 feet.
One 8 by 12 inches by 8 feet.
*Sills:*
Twenty-four 2 by 8 inches by 12 feet.
*Studs:*
†Twenty-six 2 by 4 inches by 18 feet (side).
*Fifty-four 2 by 4 inches by 12 feet (side).
*Four 2 by 4 inches by 10 feet (window).

**Lumber**—Continued.
*Studs*—Continued.
*Twenty-four 2 by 4 inches by 12 feet (end).
†Four 2 by 4 inches by 12 feet (over windows).
†Twelve 2 by 4 inches by 18 feet (end).
One 2 by 4 inches by 16 feet (end).
Two 2 by 4 inches by 12 feet (end).
Four 2 by 4 inches by 10 feet (end).
One 2 by 4 inches by 14 feet (over doors).
*Plates:*
†Twenty-four 2 by 4 inches by 10 feet (side).
†Twelve 2 by 4 inches by 10 feet (end).
*Sixteen 2 by 4 inches by 10 feet (side).
*Eight 2 by 4 inches by 10 feet (end).
*Eight 2 by 4 inches by 10 feet (stops).
*Eight 2 by 4 inches by 10 feet (on top of ties).
*Rafters:*
Forty-four 2 by 6 inches by 14 feet.
Two 2 by 6 inches by 12 feet.
Two 1 by 6 inches by 12 feet (ridge).
Two 1 by 6 inches by 10 feet (ridge).
Six 2 by 4 inches by 14 feet (collar beams).
*Joists:*
Eighty-four 2 by 10 inches by 10 feet.
160 linear feet 1 by 3 inches (bridging).
*Eight 2 by 4 inches by 10 feet (bridging).
*Twelve 2 by 6 inches by 12 feet (ties and braces).
*Sheathing* (includes 20 percent waste):
2,568 feet board measure 1 by 6 inches (roof).
*830 feet board measure 1 by 6 inches.
1,032 feet board measure 1 by 6 inches (ceiling).
1,200 feet board measure 1 by 6 inches (inside walls).
1,344 feet board measure 1 by 6 inches (outside walls).
960 feet board measure 1 by 6 inches (subfloor).
1,344 feet board measure 1 by 6 inches (drop siding).
*420 feet board measure 1 by 6 inches (drop siding).
*Flooring* (tongue-and-groove, includes 25 percent waste):
1,075 feet board measure 1 by 4 inches (ceiling).
1,400 feet board measure 1 by 4 inches (walls).
*440 feet board measure 1 by 4 inches (walls).
1,000 feet board measure 1 by 4 inches (floor).
*Ventilators in roof* (surfaced four sides):
Three 1 by 10 inches by 16 feet.
Three 1 by 12 inches by 10 feet.
170 linear feet 1 by 3 inches.
24 linear feet 1 by 4 inches.
One 1 by 10 inches by 12 feet (roof boards).
One 1 by 10 inches by 8 feet (roof boards).
One 1 by 8 inches by 12 feet (roof boards)
One 1 by 8 inches by 8 feet (roof boards).
*Trim* (surfaced four sides):
Three 1⅛ by 4½ inches by 14 feet (doors).
Eight 1⅛ by 4½ inches by 10 feet (windows).
†Four 1⅛ by 4½ inches by 18 feet (corners).
*Eight 1⅛ by 4½ inches by 10 feet.
Four 1⅛ by 4½ inches by 14 feet (end fascia).
Twelve 1 by 8 inches by 10 feet (baseboard).
Four 1 by 6 inches by 12 feet (ridge).
Four 1 by 6 inches by 10 feet (ridge).
150 linear feet 1⅛ by 2½ inches (drip molding).
*Bins:*
†Twenty-nine 2 by 4 inches by 18 feet (studs).
†Ten 2 by 2 inches by 18 feet (nailing strips).
†Twenty 1 by 6 inches by 12 feet (ties at partitions).
†Twenty 1 by 6 inches by 16 feet (ties at partitions).

**Lumber**—Continued.
*Bins*—Continued.
†Thirty-two 1 by 2 inches by 18 feet (cleats for loose boards).
†Eight 2 by 6 inches by 10 feet (over bins).
Eighteen 2 by 4 inches by 12 feet (under removable floors).
†Four hundred 1 by 4 inches by 16 feet (side).
Seventy-two 1 by 4 inches by 16 feet (removable floors).
†One hundred and sixty-two 1 by 4 inches by 16 feet (loose slats).
Eight 1 by 6 inches by 10 feet (battens for shutters and doors).
*Screens* (surfaced four sides, for foundation windows):
Three ¾ by 2 inches by 16 feet.
*Platforms:*
Five 2 by 8 inches by 12 feet (sides and floor).
One 2 by 8 inches by 14 feet (side).
Two 2 by 12 inches by 12 feet (carriages).
Two 4 by 4 inches by 12 feet (posts).
Two 2 by 4 inches by 12 feet (nailing strips).
Three 2 by 4 inches by 14 feet (joists).
Two 2 by 10 inches by 14 feet (treads).
**Roof covering:**
As desired, for 1,700 square feet.
**Building paper:**
58 squares; *4 squares.
**Miscellaneous:**
6 cellar sash and frames for 3 lights, 8- by 10-inch glass.
8 single sash and frames for 6 lights, 9- by 12-inch glass (4-inch studs).
2 no. 2 glazed doors 3 by 7 feet; 6 lights, 8- by 10-inch glass.
2 frames for glazed doors 3 by 7 feet (4-inch studs).
22 pairs 2½- by 2½-inch galvanized hinges (stove-floor vents and sash).
2 pairs 3½- by 3½-inch loose-pin butts (glazed doors).
2 pairs 6-inch galvanized T hinges (battened doors).
16 pairs 4-inch galvanized T hinges (shutters).
3 pairs ⅞- by 2¼-inch sash centers (ventilators).
3 screw eyes in ventilator.
36 linear feet ¼-inch rope.
4 bolts, ⅜ by 3 inches, with 4-inch rings (floor ventilators).
45 square feet ¼-inch mesh galvanized wire cloth (vents and foundation screens).
24 bolts, nuts, and washers ⅝ by 18 inches (foundations).
6 linear feet galvanized-iron flashing 12 inches wide (around chimney).
30 linear feet galvanized-iron flashing 8 inches wide (roof ventilators).
4 wrought-steel straps ¼ by 2½ inches (platform posts).
8 lag screws ¼ by 3 inches (platform posts).
1 sheet-metal pad and heat shield, as detailed.
8 adjusting rods and fittings for windows, as detailed.
Latches for doors, shutters, and foundation windows, as selected.
**Nails:**
2 pounds thirtypenny, 10 pounds twentypenny, 30 pounds tenpenny, 300 pounds eightpenny, 100 pounds sixpenny, 10 pounds eightpenny finishing.
**Paint:**
Three outside coats, 8 gallons.

### STORAGE HOUSE 24 BY 59½ FEET, CAPACITY ABOUT 4,000 BUSHELS IN CRATES OR 5,200 BUSHELS IN BULK

This building is designed for the storage of sweetpotatoes in crates or in one tier of bins in which the sweetpotatoes may be loaded 6 feet high.

Quantities are for dimensions shown on the drawings (9-foot 4-inch studs) and should be altered if dimensions are changed. Footings should be carried below frost line or to solid ground.

If the sweetpotatoes are to be stored in bulk, the items marked with an asterisk (*) are to be omitted. If storage is to be in crates, the stud walls should be 12 feet 4 inches high (instead of 9 feet 4 inches, as shown in the drawings), the items marked with a dagger (†) are to be omitted, and those marked with an asterisk (*) are to be included.

**Concrete:**
*Mixture:*
1 part portland cement, 3 parts sand, and 5 parts gravel or broken stone; or, 1 part portland cement and 6 parts bank-run gravel.
*Quantities:*

| Constituents | Walls | Piers |
|---|---|---|
| Cement | 109 sacks | 15 sacks |
| Sand | 12 cu. yds | 1.5 cu. yds. |
| Gravel | 20 cu. yds | 2.6 cu. yds. |
| Or— | | |
| Cement | 109 sacks | 15 sacks. |
| Bank-run gravel | 24 cu. yds | 3.3 cu. yds. |

**Chimneys:**
*Mixture for mortar:*
1 part portland cement, 3 parts sand.
*Quantities:*
Cement 10 sacks, *1 sack; sand 1⅓ cubic yards, *1⅓ cubic feet; bricks 1,560, *bricks 180; 2 terra cotta thimbles, 6-inch; 28 linear feet 8- by 8-inch terra cotta flue lining, *6 linear feet.

**Lumber:**
*Girders:*
Four 8 by 10 inches by 18 feet.
Three 8 by 10 inches by 16 feet.
*Sills:*
Twenty-eight 2 by 8 inches by 12 feet.
*Studs:*
Sixty-two 2 by 6 inches by 18 feet.
*Ninety 2 by 6 inches by 12 feet.
*Twelve 2 by 6 inches by 14 feet (gable).
*Twelve 2 by 6 inches by 10 feet (window).
†Four 2 by 6 inches by 14 feet.
*Plates:*
*Fourteen 2 by 6 inches by 12 feet (bridging).
Fourteen 2 by 6 inches by 10 feet (stops).
Seven 2 by 6 inches by 12 feet (over doors and windows).
Twenty-eight 2 by 6 inches by 12 feet.
**Ties:*
Twelve 2 by 6 inches by 12 feet.
Nine 2 by 6 inches by 14 feet.
*Rafters:*
Sixty-two 2 by 6 inches by 16 feet.
Three 2 by 6 inches by 12 feet.
Six 1 by 6 inches by 12 feet (ridge).
*Collar beams:*
Eight 2 by 4 inches by 14 feet.
*Joists:*
Forty-eight 2 by 10 inches by 16 feet.
Twenty-four 2 by 10 inches by 18 feet.
400 linear feet 1 by 3 inches (bridging).
*Sheathing* (includes 20 percent waste):
11,220 feet board measure 1 by 6 inches.
*1,400 feet board measure 1 by 6 inches.
*Flooring* (tongue-and-groove, includes 25 percent waste):
6,500 feet board measure 1 by 4 inches.
*780 feet board measure 1 by 4 inches.
**Slat floor:*
One hundred 1 by 4 inches by 18 feet.
Twenty-two 2 by 4 inches by 16 feet.
*Drop siding* (includes 20 percent waste):
2,000 feet board measure 1 by 6 inches.
*600 feet board measure 1 by 6 inches.
*Trim* (surfaced 4 sides):
Twelve ⅛ by 4½ inches by 10 feet.
*Eight ⅛ by 4½ inches by 10 feet.
†Four ⅛ by 4½ inches by 18 feet.
Four 1 by 6 inches by 16 feet.
Fourteen 1 by 8 inches by 12 feet.
160 linear feet 1⅛ by 2½ inches (drip molding).

**Lumber**—Continued.
*Ventilators in roof* (surfaced 4 sides):
Six 1 by 10 inches by 16 feet.
Six 1 by 12 inches by 10 feet.
340 linear feet 1 by 3 inches.
48 linear feet 1 by 4 inches.
Three 1 by 10 inches by 12 feet (roof boards).
Three 1 by 8 inches by 12 feet (roof boards).
†*Bins:*
Five hundred and seventy-five 1 by 4 inches by 18 feet.
Ninety-five 1 by 4 inches by 16 feet.
Forty 2 by 4 inches by 18 feet.
Fourteen 2 by 2 inches by 18 feet.
Sixty-six 1 by 6 inches by 12 feet.
Forty 1 by 2 inches by 16 feet.
Eight 2 by 6 inches by 10 feet.
Two 2 by 6 inches by 18 feet.
*Dividing partitions:*
†Ten 2 by 4 inches by 18 feet.
*Thirteen 2 by 4 inches by 12 feet.
*Six 2 by 4 inches by 14 feet.
†Five 2 by 4 inches by 12 feet (plates and bridging).
Two 2 by 4 inches by 14 feet (at ceiling).
*Screens* (for foundation windows):
Six ¾ by 2 inches by 16 feet (surfaced 4 sides).
*Platforms:*
Six 2 by 4 inches by 12 feet.
Two 2 by 8 inches by 14 feet.
Six 2 by 8 inches by 12 feet.
One 4 by 4 inches by 12 feet.
Two 2 by 12 inches by 12 feet.
Four 2 by 10 inches by 14 feet.

**Roof covering:**
As desired, for 1,860 square feet.

**Building paper:**
103 squares; *11 squares.

**Miscellaneous:**
12 foundations sash and frames for 3 lights, 8- by 10-inch glass.
12 single sash and frames for 6 lights, 9- by 12-inch glass (6-inch studs).
2 no. 2 glazed doors, 3 by 7 feet; 6 lights, 8- by 10-inch glass.
2 frames for glazed doors 3 by 7 feet (6-inch studs).
32 pairs 2½- by 2½-inch galvanized hinges.
2 pairs 3½- by 3½-inch galvanized loose-pin butts.
3 pairs 6-inch T hinges (battened doors).
4 pairs 4-inch T hinges (shutters).
6 pairs ⅞- by 2¼-inch sash centers.
8 bolts ⅜ by 3 inches, with 4-inch rings (floor ventilators).
50 linear feet galvanized flashing 8 inches wide (roof ventilators).
16 linear feet galvanized flashing 12 inches wide (around chimneys).
40 bolts, nuts, and washers, ⅝ by 18 inches.
4 wrought-steel straps ¼ by 2½ by 18 inches (platform posts).
16 lag screws ¼ by 3 inches (platform posts).
6 screw eyes (in ventilator).
72 linear feet ¼-inch rope.
90 square feet ¼-inch mesh wire cloth (vents and foundation screens).
12 adjusting rods and fittings for windows, as detailed.
2 sheet-iron pads and heat shields, as detailed.
Latches for doors, shutters, and foundation windows, as desired.

**Nails:**
10 pounds twentypenny, 180 pounds tenpenny, 400 pounds eightpenny, 50 pounds sixpenny, 15 pounds eightpenny finishing.

**Paint:**
Three outside coats, 10 gallons.

## STORAGE HOUSE 39 FEET 10 INCHES BY 100 FEET 10 INCHES, CAPACITY ABOUT 12,000 BUSHELS IN CRATES OR 15,000 BUSHELS IN BULK

This building is designed for the storage of sweetpotatoes in crates or in one tier of bins in which the sweetpotatoes may be loaded 6 feet high.

Quantities are for dimensions shown on the drawings (8-foot studs) and should be altered if dimensions are changed. Footings should be carried below frost line or to solid ground.

If the sweetpotatoes are to be stored in bulk, the items marked with an asterisk (*) are to be omitted. If storage is to be in crates, the stud walls should be 11 feet 4 inches high (instead of 7 feet 10 inches, as shown in the drawings), the items marked with a dagger (†) are to be omitted, and those marked with an asterisk (*) are to be included.

**Concrete:**

*Mixture:*

1 part portland cement, 3 parts sand, and 5 parts gravel or broken stone; or 1 part portland cement and 6 parts bank-run gravel.

*Quantities:*

| Constituents | Walls | Piers |
|---|---|---|
| Cement | 185 sacks | 34 sacks. |
| Sand | 21 cu. yds | 4 cu. yds. |
| Gravel | 34.5 cu. yds | 6.5 cu. yds. |
| Or— | | |
| Cement | 185 sacks | 34 sacks. |
| Bank-run gravel | 44 cu. yds | 8 cu. yds. |

**Chimneys:**

*Mixture for mortar:*

1 part portland cement, 3 parts sand.

*Quantities:*

Cement 30 sacks, *4 sacks; sand 3½ cubic yards, *0.3 cubic yard; bricks 5,000, *bricks 600; 6 terra cotta thimbles, 6-inch; 96 linear feet 8 by 8 inch terra cotta flue lining, *22 linear feet.

**Lumber:**

*Girders:*

Six 10 by 12 inches by 10 feet.
Fourteen 10 by 12 inches by 16 feet.
One 10 by 12 inches by 14 feet.

*Sills:*

Thirty-five 2 by 8 inches by 16 feet.

*Studs:*

†Sixty-two 2 by 6 inches by 18 feet (side).
*One hundred and twenty-four 2 by 6 inches by 12 feet (side).
Nine 2 by 6 inches by 12 feet (over windows).
†Twenty-two 2 by 6 inches by 18 feet (end).
Twenty 2 by 6 inches by 10 feet (end).
*Forty-four 2 by 6 inches by 12 feet (end).
*Eight 2 by 4 inches by 10 feet.
Two 2 by 6 inches by 14 feet (over doors).

*Plates:*

Fifty-two 2 by 6 inches by 12 feet (side).
Sixteen 2 by 6 inches by 10 feet (end).

*Purlin posts:*

†Thirty-six 2 by 4 inches by 16 feet.
†Twenty-four 2 by 4 inches by 14 feet.
*Forty-two 2 by 6 inches by 12 feet.
*Six 2 by 6 inches by 16 feet.

*Ties:*

Twenty-four 2 by 6 inches by 10 feet.
Twenty-four 2 by 6 inches by 12 feet.
Six 2 by 6 inches by 18 feet (upper).
Twelve 1 by 6 inches by 10 feet (hangers).

*Purlins:*

Twelve 2 by 6 inches by 12 feet.
†Twelve 2 by 6 inches by 12 feet.
†Six 2 by 6 inches by 10 feet.
Six 2 by 6 inches by 10 feet.
*Six 2 by 8 inches by 10 feet.
*Twelve 2 by 8 inches by 12 feet.

*Purlin braces:*

Twelve 2 by 6 inches by 14 feet.
*Six 2 by 6 inches by 14 feet.

*Rafters:*

One hundred and thirty 2 by 6 inches by 12 feet.
One hundred and thirty 2 by 6 inches by 14 feet.
Twelve 1 by 6 inches by 10 feet (ridge).

*Collar beams:*

Sixteen 2 by 4 inches by 14 feet.
Four 2 by 6 inches by 12 feet.

*Joists:*

Two hundred and two 2 by 10 inches by 12 feet.
One hundred and one 2 by 10 inches by 18 feet.
800 linear feet 1 by 3 inches (bridging).

**Lumber**—Continued.

*Sheathing* (includes 20 percent waste):

11,870 feet board measure 1 by 6 inches (roof).
5,280 feet board measure 1 by 6 inches (ceiling).
2,920 feet board measure 1 by 6 inches (inside walls).
3,450 feet board measure 1 by 6 inches (outside walls).
4,800 feet board measure 1 by 6 inches (subfloor).
*2,340 feet board measure 1 by 6 inches.

*Drop siding* (includes 20 percent waste):

3,400 feet board measure 1 by 6 inches.
*1,180 feet board measure 1 by 6 inches.

*Flooring* (tongue-and-groove, includes 25 percent waste):

5,500 feet board measure 1 by 4 inches (ceiling).
3,440 feet board measure 1 by 4 inches (walls).
5,000 feet board measure 1 by 4 inches (floor).
*1,200 feet board measure 1 by 4 inches.

*Trim* (surfaced 4 sides):

Six 1⅛ by 4½ inches by 14 feet (doors).
†Five 1⅛ by 4½ inches by 18 feet (corners).
*Eight 1⅛ by 4½ inches by 12 feet.
Eight 1⅛ by 4½ inches by 12 feet (end fascia).
Twelve 1⅛ by 4½ inches by 10 feet (windows).
Twenty-four 1 by 8 inches by 12 feet (baseboards).
Eighteen 1 by 6 inches by 12 feet (roof ridge).
350 linear feet 1⅛ by 2½ inches (drip molding).

*Ventilators in roof* (surfaced 4 sides):

Twelve 1 by 10 inches by 16 feet.
Twelve 1 by 12 inches by 10 feet.
680 linear feet, 1 by 3 inches.
100 linear feet, 1 by 4 inches.
Six 1 by 10 inches by 12 feet (roof boards).
Six 1 by 8 inches by 12 feet (roof boards).

*Dividing partitions:*

Eight 2 by 4 inches by 10 feet (plates).
*Eight 2 by 4 inches by 10 feet.
Eight 2 by 4 inches by 18 feet (studs).
Eight 2 by 4 inches by 16 feet (studs).
*Four 2 by 4 inches by 16 feet.
Eight 2 by 4 inches by 14 feet (studs).
†Four 2 by 4 inches by 14 feet (studs).
Eight 2 by 4 inches by 12 feet (studs).
Eight 2 by 4 inches by 10 feet (studs).
†Two 2 by 4 inches by 12 feet (over doors).
*Two 2 by 4 inches by 14 feet (over doors).
2,655 feet board measure 1- by 4-inch tongue-and-groove flooring (includes 25 percent waste).
*690 feet board measure 1- by 4-inch tongue-and-groove flooring (includes 25 percent waste).

*Screens* (foundation windows):

Nine ¾ by 2 inches by 16 feet (surfaced 4 sides).

*Bins:*

†Seventy-two 2 by 4 inches by 18 feet (studs).
†Twenty-one 2 by 2 inches by 18 feet (nailing strips).
†Twenty-one 1 by 6 inches by 18 feet.[2]
†Forty-two 1 by 6 inches by 12 feet.[2]
†Twenty-one 1 by 6 inches by 16 feet.[2]
†Forty-two 1 by 6 inches by 10 feet.[2]
†One hundred and eighteen 1 by 2 inches by 18 feet (cleats for loose boards).
†Forty-two 2 by 6 inches by 12 feet (over bins).
†Twenty-one 2 by 6 inches by 10 feet (over bins).
Seventy-seven 2 by 4 inches by 12 feet (removable floors).
†One thousand nine hundred and thirty-eight 1 by 4 inches by 10 feet (bin sides).
†One hundred and fourteen 1 by 4 inches by 12 feet (bin sides).
Four hundred and sixty-two 1 by 4 inches by 10 feet (removable floors).
Sixty-six 1 by 4 inches by 12 feet (removable floors).
†One thousand and eighty-three 1 by 4 inches by 10 feet (loose slats).

*Battens* (shutters and doors):

Twenty-two 1 by 6 inches by 10 feet.

[2] Ties at partitions. Stagger joints, using 12's with 18's and 16's with 10's.

*Platforms:*
Eight 2 by 4 inches by 10 feet (nailing strips).
Three 2 by 12 inches by 14 feet (carriages).
Four 4 by 4 inches by 12 feet (posts).
One 2 by 8 inches by 14 feet (sides and flooring).
Twenty-eight 2 by 8 inches by 10 feet (sides and flooring).
Ten 2 by 4 inches by 14 feet (joists).
Three 2 by 10 inches by 14 feet (treads).

**Roof covering:**
As desired, for 4,950 square feet.

**Building paper:**
230 squares; *22 squares.

**Miscellaneous:**
18 cellar sash and frames for 3 lights, 8- by 10-inch glass.
18 single sash and frames for 6 lights, 9- by 12-inch glass (6-inch studs).
4 no. 2 glazed doors, 3 by 7 feet, and frames for 6-inch studs.
4 frames for inside doors, 3 by 7 feet, 4-inch studs.
60 pairs 2½- by 2½-inch galvanized hinges (stove-floor vents and windows).
8 pairs 6-inch galvanized T hinges (battened doors).
36 pairs 4-inch galvanized T hinges (shutters).
12 pairs 7/8- by 2¼-inch sash centers.
4 pairs 3½- by 3½-inch loose-pin butts (glazed doors).

**Miscellaneous**—Continued.
12 screw eyes (ventilator).
144 linear feet ¼-inch rope.
24 bolts ⅜ by 3 inches with 4-inch rings (floor ventilators).
130 square feet ¼-inch mesh galvanized wire cloth (vents and foundation screens).
50 bolts, nuts, and washers, ⅝ by 18 inches (foundation).
40 linear feet galvanized flashing 12 inches wide (around chimneys).
100 linear feet galvanized flashing 8 inches wide (roof ventilators).
8 wrought-steel straps ¼ by 2½ by 18 inches (platform posts).
16 lag screws ¼ by 3 inches (platform posts).
18 adjusting rods and fittings for windows, as detailed.
6 sheet-iron pads and heat screens, as detailed.
Latches for doors, shutters, and foundation windows, as desired.

**Nails:**
12 pounds thirtypenny, 25 pounds twentypenny, 77 pounds tenpenny, 930 pounds eightpenny, 190 pounds sixpenny, 30 pounds eightpenny finishing.

**Paint:**
Three outside coats, 20 gallons.

## METHODS OF HEATING A STORAGE HOUSE

A small house can be heated with a sheet-iron stove that will burn knots and other pieces of wood. Coal stoves may be used if preferred, but air-tight wood stoves will serve the purpose. It requires a longer time to get up heat with a coal stove than with a wood stove, and this is one disadvantage in using coal. Often all that is necessary to raise the temperature a few degrees is to start a little wood fire. In a commercial storage house a hot-air heater or a hot-water boiler, with pipes around the walls, would be preferable to a stove, but a house that will hold as many as 10,000 to 25,000 bushels of sweetpotatoes may be heated with good stoves. The location of the stoves in the house depends on the size of the house and the direction of the cold winds. Ordinarily, where one stove is used, it is placed near the center of the house, but if the cold wind strikes one end the stove should be in that end. The larger houses have a stove in each end, but in cases where the house is divided into rooms it is necessary that a stove be placed in each room. Considerable open space should be left around the stoves to prevent the sweetpotatoes from being injured by excessive heat. In large houses it is desirable to put in partitions to make separate rooms. Each room should have a stove or other independent heating unit. Small storage houses are sometimes heated with oil stoves with satisfactory results. In most sections of the South it is not necessary to keep heat in the storage house much of the time.

## UTILIZING ABANDONED TENANT HOUSES AND OTHER STRUCTURES

On many farms in the South there are abandoned tenant houses and various other buildings that can be converted into sweetpotato storage houses at very little expense. In many towns there are warehouses, store buildings, and other structures that can be utilized to advantage for storing sweetpotatoes. Where such structures are available on the farms or in towns they should be utilized before new houses are erected. The same methods of insulating and ventilating should be used in remodeling old structures as are recommended for

new sweetpotato storage houses. Where the interior of the house to be remodeled is not already sheathed it is advisable to nail a layer of 1- by 4- or 1- by 6-inch boards on the studding, then a layer of building paper, and over this matched boards, as shown in figure 12. The tighter the house is made, the less attention is required to keep the temperature and moisture under proper control.

Where only a few bushels of sweetpotatoes are to be stored they may be kept in a loft over the kitchen or in any place in the house where the temperature is quite uniform (between 50° and 60° F.) and the air rather dry.

## STORAGE PITS AND CELLARS

Storage in banks and pits is sometimes necessary, and the best methods of storing in them and in outdoor cellars are here described. The main disadvantages in the pit or bank method of storage are (1) the large proportion of loss due to decay; (2) the inferior quality of

FIGURE 13.—A pile of sweetpotatoes ready to be covered with cane tops and soil. Note the ventilating hole which extends through the center of the pile.

the sound sweetpotatoes, due to lack of proper curing ; (3) the loss on the market, because banked roots will keep for such a short period after being removed; and (4) the inconvenience of getting the sweetpotatoes when needed, especially during cold or rainy weather. If it is impossible to build a storage house the sweetpotatoes should be cared for in some other way, and it is much better to store in pits or outdoor cellars than not to store them at all. By using the best methods of banking known, the loss by decay can be materially reduced but not eliminated, because it is impossible to control the moisture and temperature.

Storage pits should be located where the drainage is good. In making a pit a little of the surface soil is thrown back to form a level bed of the size desired. It is a good plan to dig two small trenches across the bed at right angles to each other to provide for ventilation at the bottom. Lay boards or place troughs over the trenches, and at the point where the trenches cross set a small box with open ends to form a flue up through the pile of sweetpotatoes, as shown in figure 13.

The earth floor of the pit is covered with 4 or 5 inches of straw, hay, leaves, or pine needles, and the roots are placed in a conical pile around the flue. A covering of straw, hay, or similar material is put on the pile and over this a layer of soil. The covering of soil should be only a few inches thick at first but should be increased as the weather gets cold. Keep the ends of the trenches and flue open until it is necessary to close them to keep out the frost. It is better to make several small pits rather than one large one, because it is best to remove the entire contents when the pit is opened. Figure 14 shows a number of pits with a trough ventilator placed over the top of each pile of sweetpotatoes.

A type of storage cellar similar to the one shown in figure 15 is often used in the South for storing sweetpotatoes. This form of storage is much better than pits or banks. The sweetpotatoes can be cured in the outdoor cellar, and it is easier to get them out when wanted for the table or for market. A good type of outdoor cellar

FIGURE 14.—Sweetpotato banks, illustrating the method of ventilation by the use of troughs at the top of each pile.

can be made as follows: Set a line of posts for the center supports and on these posts put a ridgepole. Against the ridgepole place one end of planks, poles, or slabs, with their opposite ends resting on the ground on either side. The ends of the enclosure are boarded up, a door being provided in one end. The structure is covered with sod to a thickness of 5 or 6 inches. It is a good plan to put a ventilator through the top and to leave 2 or 3 openings in the sides near the ground. Provision should be made to close all these openings during cold or wet weather. If a small stove is placed in the storage cellar the sweetpotatoes can be cured in the way that has been described for the storage house. The roots are usually piled on a layer of straw, leaves, or pine needles placed on the ground. A better method is to build a slat floor a few inches from the ground and pile the roots on the floor. This floor will allow for the circulation of air under the roots, which will aid in curing them.

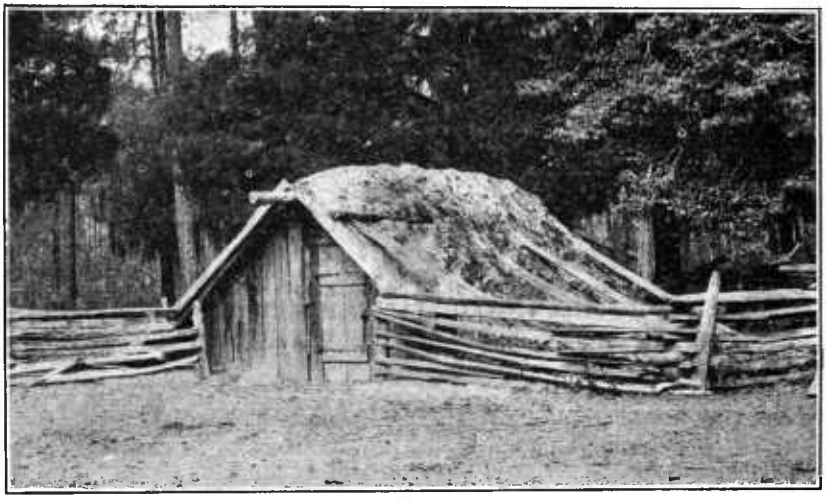

FIGURE 15.—A type of outdoor cellar used in some sections of the South for storing sweetpotatoes. This structure should have openings near the bottom and through the top for the purpose of ventilation.

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